IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF WEST VIRGINIA
AT HUNTINGTON

OHIO VALLEY ENVIRONMENTAL COALITION, WEST VIRGINIA HIGHLANDS CONSERVANCY, and SIERRA CLUB,

Plaintiffs,

v. **CIVIL ACTION NO. 2:13-5006**

FOLA COAL COMPANY, LLC,

Defendant.

PLAINTIFFS' POST-TRIAL BRIEF

Plaintiffs claim that Defendant Fola Coal Company, LLC (Fola) is in violation of its permits under the Clean Water Act (CWA) and the Surface Mining Control and Reclamation Act (SMCRA) because its discharges from Outlet 029 at its Surface Mine No. 3 are causing or materially contributing to the biological impairment of Stillhouse Branch—the receiving stream—and leading to material damage to the hydrologic balance outside of the permit area. This is the second case of its type to be tried before this Court. In its decision after the first trial in *OVEC v. Elk Run Mining Co.*, the Court decided the standard for liability that should guide its analysis of the evidence in this case. The Court ruled that "a WVSCI score below the impairment threshold of 68 indicates a violation of West Virginia's biological narrative water quality standards, as embodied in § 47–2–3.2.e and –3.2.i, in the stream where the score was assessed." 2014 WL 2526569, at *18. Here, it is undisputed that Stillhouse Branch has a WVSCI score below 68 and is on West Virginia § 303(d) List, that the stream is biologically impaired, and that the impairment is caused by Fola's Surface Mine No. 3. JE 13; JE 43, at JE128-29; JE 59; Trial Transcript (Tr.) 80-81, 87, 651.

To prevail on their CWA claims, Plaintiffs must prove by a preponderance of evidence that the discharge of pollutants from Outlet 029 has caused or materially contributed to the low WVSCI score and biological impairment. To prevail on their claims under SMCRA, Plaintiffs must prove by a preponderance of the evidence that discharges of pollutants from Outlet 029 has caused or contributed to the low WVSCI score and, thus biological impairment, *or* that Fola has caused material damage to the hydrologic balance.

At trial, Plaintiffs presented multiple lines of evidence to demonstrate that Fola's discharges of pollutants, namely ionic chemicals, characteristic of alkaline mine drainage and measured as conductivity, are the cause (or at the very least a contributing factor) of the observed impairment. Not only did Fola's experts fail to make their own findings of causation, one of them—Dr. Charles Menzie—admitted that conductivity is at least a contributing factor when he testified that high conductivity, temperature and habitat are multiple stressors that combine together to contribute to the observed impairment in Stillhouse Branch. Tr. 527, 644, 651-53. Based on the undisputed facts of biological impairment and discharges of ionic chemicals, Plaintiffs have easily met their burden of proof by a preponderance of the evidence.

Facts

I. Fola Has Discharged Ionic Pollutants, Associated with Alkaline Drainage, and Measured as Conductivity, into a Biologically Impaired Stream

Fola holds West Virginia Surface Mining Permit S200995, which regulates Fola's mining activities at Surface Mine No. 3, located in Clay and Nicholas Counties, West Virginia. JE 43 at JE125-26. WV/NPDES Permit WV1014005 regulates discharges into Stillhouse Branch from that mine. *Id*. Surface Mine No. 3 has a valley fill (Durable Rock Fill No. 2) that fills over 90% of Stillhouse Branch. *Id.*; Tr. 78. Outlet 029 near the base of that fill is the sole source of water flowing into Stillhouse Branch, a tributary of Twentymile Creek. Tr. 78; JE 43 at JE126;

see site photo at PE363. Fola's mine is the only development activity upstream from Outlet 029. JE 43 at JE126.

Fola's WV/NPDES Permit WV1014005 incorporates by reference the WV/NPDES Rules for Coal Mining and Facilities found in Title 47, Series 30, which include § 47-30-5.1.f: "The discharge or discharges covered by a WV/NPDES permit are to be of such quality so as not to cause violation of applicable water quality standards promulgated by [West Virginia Code of State Rules § 47-2]. . . ." Doc. 80, p. 3. West Virginia's narrative water quality standards are violated if wastes discharged from a surface mining operation "cause . . . or materially contribute to" 1) "[m]aterials in concentrations which are harmful, hazardous or toxic to man, animal or aquatic life" or 2) "[a]ny other condition . . . which adversely alters the integrity of the waters of the State." 47 C.S.R. § 47-2-3.2.e, -3.2.i. Additionally, "no significant adverse impact to the chemical, physical, hydrologic, or biological components of aquatic ecosystems shall be allowed." *Id*., § 47-2-3.2.i.

Fola's SMCRA permit S200995 requires it to meet performance standards promulgated pursuant to the state Surface Coal Mining and Reclamation Act. 22 W.Va. Code § 22-3-13. Among these performance standards are the requirements that 1) "discharge from areas disturbed by surface mining shall not violate effluent limitations or cause a violation of applicable water quality standards," 38 C.S.R. § 2-14.5.b, and 2) "[a]ll surface mining and reclamation activities shall be conducted . . . to prevent material damage to the hydrologic balance outside the permit area." 38 C.S.R. § 2-14.5.

Plaintiffs' claim in this action that Fola has violated the conditions of each of its permits through the discharge of high levels of ionic pollution, measured as conductivity from Outlet 29. Conductivity from surface mines is result of the excavation and re-deposit of previously buried

material during the mining process. As a consequence of mining, pyritic material in coal residues are exposed to weathering and release sulfuric acid. Tr. 25, 355. This acid is neutralized by carbonate bedrock, but in the process the rock is dissolved. *Id.* This dissolution releases high concentrations of coal-derived sulfate ions accompanied by elevated concentrations of calcium, magnesium and bicarbonate. *Id.* The strength of the resulting mixture of ions, commonly referred to as alkaline mine drainage, is commonly measured as conductivity.[1] Tr. 24, 178.

In West Virginia, EPA and other researchers have used high sulfate levels as an indicator of alkaline mine drainage characteristic of surface mining in the region. *See e.g.* EPA Benchmark, JE 58, p. JE391 (explaining that EPA filtered data used in deriving its conductivity benchmark by including sites only where the salt mixture was dominated by sulfates); Tr. 24, 38; PE 13 at PE177. The ionic mixture from these mines is “widespread in the region” and has a “consistent mixture of ions” with “similar proportions of calcium, magnesium, bicarbonate, and sulfate.” PE 5 at PE88; Tr. 261-63.

Chemical measurements at Stillhouse Branch show that the stream has been affected by conductivity from Surface Mine No. 3. In 1994-95, prior to mining, the levels of conductivity and sulfate in Stillhouse Branch were low, with conductivity measured at 47-104 µS/cm and sulfate at 4-22 mg/l. JE 43 at JE126, Tr. 88-89, 92, 294-95. This is consistent with background levels of conductivity in the region. Tr. 35, PE 3, p. PE 71. After mining began, conductivity rose to over 3,000 µS/cm and sulfate rose to over 2,000 mg/l. JE 43 at JE127-28; JE 21 at JE86. In 2008, the West Virginia Department of Environmental Protection (WVDEP) classified Stillhouse Branch as biologically impaired. JE 43 at JE128. It is still listed as biologically

[1] For simplicity, Plaintiffs will frequently refer to ionic pollution associated with alkaline drainage in West Virginia simply as “conductivity.”

impaired on WVDEP's § 303(d) List. *Id.* at JE129; JE 54. WVDEP has determined that ionic toxicity is the primary stressor in Stillhouse Branch. DE 8, p. 15; Tr. 181-82. Since 2011, discharges from Outlet 029 have frequently contained conductivity levels over 3,000 µS/cm. JE 43 at JE129-30; Tr. 89-90, 296. In September 2013, the discharge from Outlet 029 and the stream below it contained conductivity at a level of about 2,825 µS/cm and sulfate at about 2,000 mg/l. JE 4; Tr. 85.

The ionic mixture discharged by Fola from Outlet 029 contains elevated levels of sulfate, calcium, bicarbonate, and magnesium, which are the ions characteristic of high-conductivity alkaline mine drainage discharged from mountaintop mines in West Virginia. JE 4; JE 81 at JE1018; Tr. 23-24, 117, 168, 178-80, 187-88, 261-63, 366-68. Fola's mine discharges alkaline mine drainage into Stillhouse Branch that is characteristic of mines in Central Appalachia. Tr. 23, 171. In 2013, the discharge water was alkaline and contained very elevated levels of sulfate and calcium. JE 4; JE 25; Tr. 187-88. When calcium is present, so is bicarbonate, because these are the two component ions of calcium carbonate that is consistently found in alkaline mine drainage. Tr. 366-67. In 2012, WVDEP measured sulfate, calcium, bicarbonate (as alkalinity), and magnesium in Stillhouse Branch. JE 81 at JE1018. The concentrations of each of these ions was at least an order of magnitude higher than any of the other ions measured. *Id.* Those predominant ions from Stillhouse "are the four most common ions to drain from surface coal mines" and "for the circum-neutral to alkaline drainage from surface mines and valley fills, these four primary ions are highly correlated with conductivity." JE 58 at JE408-09.

Biological sampling of Stillhouse Branch below Outlet 029 has consistently measured WVSCI scores to be below 68, which EPA considers to be the threshold for impairment. PE 20; Tr. 57. This sampling has also revealed the stream to be depauperate of taxa sensitive to

conductivity. Tr. 82. In May 2012, WVDEP measured the WVSCI at the mouth of Stillhouse Branch and found it to be 31.6. JE 43 at JE129. In September 2013, Plaintiffs' expert Dr. Swan measured the WVSCI downstream from Outlet 029, but upstream from the influence of culverts and a railroad crossing, and found it to be 58.17. JE 13 at JE48; Tr. 77-78, 81.[2] Within the three orders of sensitive taxa, Dr. Swan found no mayflies, only two families of relatively tolerant caddisflies, and only one family of stoneflies. Tr. 82.

Dr. Swan also used EPA's Rapid Bioassessment Protocol (RBP) to score the habitat at his sampling site at 130, which is in the suboptimal category. Tr. 98. Fola did not challenge Dr. Swan's benthic or habitat scores. Tr. 648.

II. The Scientific Literature Shows that Ionic Pollution in Alkaline Mine Drainage, Measured as Conductivity, Causes Biological Impairment

Aquatic insects, like mayflies, evolved in waters with low ionic concentrations and are unable to survive in water with high concentrations of ions from alkaline mine drainage . Tr. 25-26, 833-34; *see also*, Tr. 35 *quoting* PE 3 at PE71 (explaining background levels of conductivity in the region are approximately 116 µS/cm). The relationship between high conductivity and biological impairment from alkaline mine drainage has been clearly established by about twenty studies in the scientific literature written by over fifty authors. Tr. 26, 28-29. There is no published literature to the contrary. Tr. 29.

The first major article quantifying the relationship between ionic pollution and biological degradation was a peer-reviewed study by EPA scientist Gregory Pond, published in 2008. PE 15. Pond first showed that conductivity was much higher at mined sites than at unmined sites. Tr. 31. He then explained that "[f]our lines of evidence indicate that mining activities impair biological condition of streams: shift in species assemblages, loss of Ephemeroptera [mayfly]

[2] Using EPA's more sensitive metric, called GLIMPSS, Dr. Swan scored the stream at 27.7, which is below the impairment threshold of 53. *Id.*; Tr. 80-81.

taxa, changes in individual metrics and indices, and differences in water chemistry." PE 15 at PE202; Tr. 40. Pond demonstrated that conductivity is "the primary leading factor" and "the best predictor of the gradient of conditions found downstream of alkaline mine drainage and valley fill sites in the Central Appalachians." Tr. 44, 171; PE 15 at PE215. Pond also found that conductivity is a much more significant cause of impairment than either embeddedness[3] or temperature. Tr. 41. Pond concluded that "[o]ur results confirm that mountaintop mining impact to aquatic life is strongly correlated with ionic strength in the Central Appalachians." Tr. 169, 213; PE 15 at PE210.

Following up on his 2008 work, Pond published a peer-reviewed study in 2010 that similarly concluded that "[a]nalyses from West Virginia mining areas . . .indicated that the decline of mayflies from mountaintop mining correlates most strongly to specific conductance." PE 16 at PE233; Tr. 171. He found "that the abundance of mayflies declines dramatically in mined streams even in comparison to watersheds that have a little bit of mining and residential development in them." PE 16 at PE233; Tr. 45. In 2011, Pond published another peer-reviewed study which found "that when you get disturbance in a watershed, you can get a reduction in stoneflies and caddisflies, but the greatest reduction is in the mined sites." PE 17, p. PE240; Tr. 46.

In 2011, EPA scientists including Pond, Glenn Suter, and Susan Cormier, summarized the existing science connecting conductivity and biological degradation in an EPA report entitled, "A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams" (the Benchmark). JE 58. The Benchmark used EPA's standard method for deriving water-quality criteria, based on the species sensitivity distributions of common genera in the

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[3] Embeddedness refers to the siltation which has built up between the rocks on the bottom of the creek. *OVEC v. Elk Run Mining Co.*, 2014 WL 2526569, at *26 (S.D.W.Va. 2014).

region, to derive a conductivity benchmark of 300 µS/cm. JE 58 at JE381. A statistical analysis included in the Benchmark shows that at a conductivity level of 300 µS/cm a stream is 59% likely to be impaired and at a conductivity level of 500 µS/cm a stream is 72% likely to be impaired. *Id.* at JE464; Tr. 63-64, 247-48.

In preparing the Benchmark, EPA conducted a detailed causal assessment using a weight-of-evidence test and concluded that there is a causal relationship between conductivity and biological degradation in West Virginia. JE 58 at JE429, 468; Tr. 256. EPA conducted an additional evaluation of confounding factors and determined that habitat, deposited sediment (embeddedness), temperature, and sediment ponds do not confound the relationship between conductivity and biological degradation. JE 58 at JE480-83, 486, 492-93, 499; Tr. 65-68, 275-78, 282-84.

The Benchmark was peer-reviewed by a select panel chosen by EPA's Science Advisory Board (SAB). This SAB itself, which included the well-known dean emeritus of a university epidemiology department, was then able to review the Benchmark and comments of the panel before approving it for final publication. Tr. 60-62, 70-73, 509-11. The SAB recommendations passed on to EPA found that the Benchmark presented a "convincing case" that there is a "strong relationship" between elevated stream conductivity and loss of benthic macroinvertebrate taxa. PE 25 at PE383; Tr. 73.

In 2013, Cormier and Suter published three studies based on different sections of EPA's benchmark report. PE 3, 5, 8. One of those confirmed the Benchmark's conclusion that, based on 2,210 stream samples in West Virginia, when conductivity reaches 300 µS/cm, five percent of local benthic invertebrate genera are extirpated. PE 3 at PE71; Tr. 34-35. A second study contained a detailed causal analysis and showed that "the mixture in streams with elevated

conductivity and neutral or somewhat alkaline waters in Appalachia can cause and is causing the extirpation of sensitive genera of macroinvertebrates." PE 5 at PE93; Tr. 181. This evaluation was based on EPA's CADDIS method, adapted from principles of epidemiology laid out by Sir Bradford Hill. Tr. 256. In that paper Cormier and Suter "found that a mixture containing the ions calcium, magnesium, bicarbonate, and sulfate, as measured by conductivity, is a common cause of extirpation of aquatic macroinvertebrates in Appalachia where surface coal mining is prevalent." PE 5 at PE85; Tr. 257. This analysis considered multiple lines of evidence, and found that nothing pointed to a non-causal relationship between conductivity and biological degradation. Tr. 272. Most evidence pointed to a strong and unequivocal causal relationship. *Id.* The third study analyzed twelve possible confounding factors, including habitat and temperature, and reached the same conclusion as EPA did in the Benchmark—that these factors do not confound the relationship between conductivity and biological degradation. PE 8; Tr. 272-74. In addition to the scrutiny already undergone in the Benchmark, each of these papers was subject to additional peer-review before publication. PE 3, 5, 8; Tr. 257.

EPA's conclusions in the Benchmark and subsequent papers by Cormier and Suter are supported by the work of independent scientists, including Plaintiffs' experts, Dr. Margaret Palmer and Dr. Ryan King. In 2010, Dr. Palmer published a study in *Science* that corroborated Pond's finding that as conductivity increases, there is a decline in the WVSCI and in the number of intolerant and mayfly genera. PE 13 at PE177; Tr. 38-39. Dr. Palmer also published a peer-reviewed study in 2011 which concluded that "[a]ll research to date indicates that conductivity is a robust measure of the cumulative or additive impacts of the elevated concentrations of multiple chemical stressors from mine sites that lead to biological impairment of streams." PE 1 at PE14; Tr. 32. Dr. Ty Lindberg published a peer-reviewed study in 2011 finding that "[a]ll tributaries

draining mountaintop-mining-impacted catchments were characterized by high conductivity and increased sulfates," and the data from Stillhouse are consistent with that conclusion. PE 11 at PE150; Tr. 36-37.

Dr. Eric Merriam published a peer-reviewed study in 2012 which found that mining in southern West Virginia "caused acute changes in water chemistry" and also found "a high degree of agreement between mining and specific conductance for the observed biological impairment." PE 12 at PE156, PE166; Tr. 208-09. Merriam showed that increased levels of mining resulted in "increases in specific conductance and associated dissolved chemical constituents (that is, sulfate, calcium, magnesium, sodium, and nitrate)." PE 12 at PE167-68; Tr. 209-10. Mining also "resulted in significant alterations to macroinvertebrate community structure through decreases in sensitive taxa," particularly mayflies. PE 12 at PE168; Tr. 210. "These alterations led to significant decreases in the WVSCI score." *Id.* "Increased specific conductance is consistently the dominant stressor in streams affected by mountaintop removal mining in West Virginia." *Id.* Merriam also found that "conductance may be a reliable single indicator of coal-mining influence on aquatic ecosystems" and that biological impairment occurred at 250 µS/cm. PE 12 at PE168; Tr. 211.

In his 2102 peer-reviewed "How Many Mountains" study, Dr. King confirmed the relationship between conductivity and biological impairment using statistical methods different than that used by EPA in deriving its benchmark, and a dataset filtered to remove the effects of confounding factors. PE 2; Tr. 238-40. EPA looked at the conductivity level at which different genera disappear from streams, while King used a different statistical method called TITAN to analyze the conductivity level at which there is a sharp non-linear decline in the occurrence or abundance of aquatic species. Tr. 239-40. Also using the TITAN method, he aggregated taxa

responses to identify the point at which the community-level threshold response reaches its failing WVSCI and GLIMPSS scores. Id.; PE 2 at PE23, Table 1. For a WVSCI score of 68, indicating biological impairment, the threshold levels identified by TITAN were 308 µS/cm for conductivity and 50 mg/l for sulfate. PE 2 at PE23; Tr. 239, 247. Thus, despite using different methods and different datasets, Dr. King and EPA arrived at remarkably consistent conclusions that the threshold based on conductivity is about 300 µS/cm. Tr. 241-44. Additional analyses were done to identify specific taxa that would respond positively or negatively to increased ionic pollution. Tr. at 223-25.

In 2014, Pond published another peer-reviewed study. He collected data from mining sites that are independent of other datasets and reached the same conclusions as in prior studies. PE 19; Tr. 218. He selected streams with similar temperatures and habitat to eliminate those two conditions as potential confounding factors, and after controlling for those conditions, found that mayflies were present at all of the reference stream sites but absent from most of the mined sites below valley fills. PE 19 at PE294; Tr. 52-57. While he recognized that habitat factors, including temperature, could limit the biological potential of a stream, he concluded that biological condition in streams was more strongly influenced by water chemistry than by local or landscape level influences on habitat. PE 19 at PE298; Tr. 788-89. He found that even eleven to thirty-three years after the completion of reclamation, the water quality at a majority of the streams below valley fill sites was still impaired by conductivity. PE 19 at PE287; Tr. 49-50. As Dr. King did in his "How Many Mountains" paper, Pond identified specific taxa that respond particularly favorably or unfavorably to increases in conductivity. PE 19 at PE294; Tr. 219-20.

III. Plaintiffs' Expert Testimony

A. Dr. Margaret Palmer

Dr. Margaret Palmer was qualified as an expert in aquatic ecology, particularly as it

relates to ionic stress in headwater streams. Tr. 20. Dr. Palmer summarized the current state of the literature showing a causal relationship between high conductivity and biological degradation. Tr. 25-73. She explained that to her knowledge there was no research that contradicted that relationship. Tr. 74. She noted that a key marker of biological degradation as a result of conductivity, consistently identified in the literature, is the decline or absence of mayflies. Tr. 25-26. She explained, "[m]ayflies are the most sensitive. They're sensitive in general, but in the case of elevated conductivities in this streams, numerous studies have shown that they decline or completely disappear as conductivity increases." *Id.*

Dr. Palmer visited the Stillhouse site, sampled the stream, and reviewed the available chemical and biological data pertaining to the site. Tr. 75-90. She visited the same sample area where Dr. Swan took biological samples. Tr. at 81. She explained that sampling at this site was appropriate because it was below the outfall in question and the constructed region associated with the mine, but above a road crossing which could have separate impacts on the stream. Tr. 78. This is consistent with direction from the West Virginia Standard Operating Procedures, which provide that, "[a]ssessments are conducted upstream of and should not include roads, bridges/culverts, if possible." JE 64 at JE887. She confirmed that there were no other impacts above the sample site except for Fola's mine. Tr. 78.

Dr. Palmer described the section of stream she visited as partially embedded and partially covered by trees. *Id.* She noted that there some eroded banks, and the area was not fully forested. *Id.* at 98. During cross-examination she explained that there was "plenty of leaf litter" and even some wood in that section of stream, which would provide a source of dissolved carbon. *Id.* at 132-33. Although she observed fairly swift flows from a concrete spillway, she pointed out a plunge pool at the bottom, which she concluded would help reduce the rate of flow

and dissipate energy of the water entering the stream itself. *Id.* at 141, 186. Overall she agreed with the ratings that Dr. Swan had assigned in his Rapid Biological Assessment and did not believe that the habitat in Stillhouse Branch could explain the level of impairment measured there. *Id.* at 97-98.

To determine whether the embeddedness she observed in Stillhouse Branch was related to conductivity (in the form of ionic precipitation) as opposed to sedimentation, Dr. Palmer carried out a streamside experiment using rocks from the sample site. *Id.* at 93-95. She placed the rocks in reverse-osmosis water with very low background conductivity. *Id.* at 93. Over the next 15 minutes or so the conductivity of that water increased as ions from the precipitate deposits on the rock were re-dissolved into solution. *Id.* at 94. She concluded from this that the material on the bottom of the stream was not in fact sediment but rather chemical precipitates. *Id.* A geochemist, Dr. Karen Prestegaard, later confirmed that the material was largely composed of manganese and either calcium sulfate or calcium carbonate. *Id.* at 762-63. To the extent that embeddedness is a problem in that section of stream, it is the result of discharges of high levels of ions from Fola's mine.

Based on the extreme levels of conductivity and sulfate in Stillhouse Branch, the available habitat, the low biological scores, and the complete absence of mayflies, Dr. Palmer concluded that there is no question that the ionic mixture in Fola's discharges, including the elevated conductivity and sulfates, is causing the observed biological impairment in the stream. Tr. 21, 25, 90-91, 117. She pointed out that the absence of mayflies was particularly compelling because EPA had found mayflies at nearly 100% of sites with temperature greater than 22 °C and in her own research she has found mayflies in streams with temperatures as high as 30 °C and Stillhouse did not exceed that temperature. Tr. 68-69, 83. She also stated that the stream would

receive a WVSCI score of 68 or lower if conductivity was treated to below 300 µS/cm. Tr. 154.

B. Dr. Ryan King

Dr. King was qualified as an expert in aquatic ecology, entomology and ecological data analysis. Tr. 206. Although Dr. King has a strong foundation in conventional statistics, he prefers to describe himself as an "ecological data analyst" because of the breadth of the field of statistics. *Id.* at 199. He has, however, participated in committees in the Department of Statistics at Baylor University. *Id*. at 376. He also co-developed a statistical technique---TITAN—which is used by other researchers in his field. *Id.* at 377-78. Dr. King also has extensive experience in helping to develop water quality criteria and is currently working on projects that will contribute to a new water quality standard for atrazine as well as numeric phosphorous criteria that will determine whether discharges from Arkansas will violate water quality standards in Oklahoma waters. *Id.* at 200-201. In the latter project he is part of a government appointed team that will resolve ongoing litigation between the states that was heard by the Supreme Court in 1992. *Id; see also, Arkansas v. Oklahoma* 504 U.S. 91 (1992).

Like Dr. Palmer, Dr. King summarized some of the studies showing a causal relationship between high conductivity and biological degradation. Tr. 208-28; 238-48. He stated that there is "almost a mountain" of scientific literature that repeatedly shows that mayflies and other taxa are highly sensitive to conductivity associated with surface mines. Tr. 217. Dr. King explained that biologists look at benthic data to assess biological impairment because aquatic insects are "long-term integrators" of stream conditions. Tr. 236-37. The health of the aquatic insect community functions like a "movie reel" instead of a "snapshot" of what is happening in the stream. *Id.*

Dr. King testified that that literature contains multiple lines of evidence to support that

conclusion. The EPA Benchmark used the West Virginia database to determine the conductivity level at which a species is absent from a stream. JE 58; Tr. 239. It then validated those findings using a database from eastern Kentucky. Tr. at 243; JE 58 at JE589. Pond's 2008 and 2014 studies collected data from mining sites that were each independent of that database and reached the same conclusion that EPA did. Tr. 218, 244-45. Dr. King's "How Many Mountains" study used a different statistical method, TITAN, to analyze the conductivity and sulfate level at which there is a community-level response, and at different endpoints including GLIMPSS and WVSCI. Tr. 239-40, 247. Despite using different methods and different data sets, EPA, Pond, and Dr. King all found conductivity associated with alkaline mine drainage is very strongly linked to biological impairment, that impairment starts when conductivity is around 300 µS/cm, and that impairment continues to get worse as conductivity increases. Tr. 241-45. They also all found that the same taxa are sensitive or tolerant to conductivity and sulfate. Tr. 220-228.

Dr. King calculated that 53% of sites in the West Virginia database have a failing WVSCI score when the conductivity is 301-400 µS/cm, and 97% fail when the conductivity is over 1500 µS/cm using the dataset form his "How Many Mountains" paper. Tr. 249; JE 25 at JE104. This corresponds to an analysis in the EPA Benchmark that 59% of sites in their database were impaired at conductivity levels of 300 µS/cm. Tr. 248; JE 58 at JE464. Even WVDEP has found that conductivity is a definite stressor when it exceeds 1533 µS/cm, a likely stressor when it exceeds 1075 µS/cm, and a probable stressor when it exceeds 700 µS/cm. Tr. 250-51; JE 61 at JE700. While WVDEP is hesitant to recognize the effects of conductivity at 300 µS/cm, its "definite stressor" threshold corresponds well with Benchmark and Dr. King's own findings of the level of conductivity at which nearly all streams will be impaired.

Dr. King concluded that there is a consensus in the scientific literature that conductivity

causes impairment. Tr. 252-53. It is "a remarkably strong predictive relationship" that is supported by repeated analyses. *Id.* He explained that this kind of consensus was the goal of the scientific process, and that once repeated analyses came to the same conclusion the findings would only "very rarely" be overturned through further research. *Id.* He further stated that it would not have been necessary to perform a formal causal analysis to support that conclusion about causation, because the relationship has been tested and confirmed so many times that it has been accepted as a "fact of science." *Id.* at 254-55.

Even if a formal causal analysis were required, Dr. King explained that Cormier and Suter have performed one and it confirms the causal relationship. They analyzed six characteristics of causation: co-occurrence, preceding causation, interaction, alteration, sufficiency, and time order, and found that five of the six strongly supported the causal relationship. PE 5; Tr. 258-72. The sixth characteristic was scored as no evidence. Tr. 271. There was no evidence that pointed to the absence of a causal relationship. Tr. 272.

Specifically, in analyzing the co-occurrence characteristic of causation, Cormier and Suter included Stillhouse Branch in their analysis and found that it supported the causal relationship. PE 5 at PE87-88; Tr. 261. They gave the preceding causation characteristic the highest score (+++) in support of the causal relationship, because the ionic mixture at mined sites in West Virginia is widespread and consistent. PE 5 at PE88; Tr. 261-63. They also found strong evidence of causation in terms of the mechanism of exposure causing impairment, because high conductivity is known to disrupt the physiology of aquatic organisms. PE 5 at PE89; Tr. 264-66. For the alteration characteristic, there is strong (+++) evidence that high conductivity extirpates a consistent set of sensitive genera. PE 5 at PE90; Tr. 266-67. For the sufficiency characteristic, there is evidence that the same level of conductivity that is sufficient

to harm sensitive taxa in laboratory studies also harms them in field studies. PE 5 at PE91; Tr. 267-70. There is also strong evidence (+++), corroborated with different methods in four independent studies, that as conductivity increases, stream conditions and benthic diversity decrease. PE 5 at PE92-93; Tr. 270-71. While Cormier and Suter did not have pre-mining evidence to evaluate the time order characteristic, that evidence exists in this case and shows that conductivity and sulfate levels rose dramatically after mining in the Stillhouse Branch watershed. Tr. at 296.

The adverse effect of conductivity on mayflies is also supported by a recent laboratory study. Dr. James Kunz analyzed reconstituted waters from Boardtree Branch—the watershed adjacent to Stillhouse Branch—that had an "ionic composition representative of alkaline mine drainage associated with mountaintop removal and valley-fill impacted streams." PE 10 at PE140; Tr. 285. Kunz selected a mayfly that is one of the more tolerant species in order Ephemeroptera, but "is representative of native Appalachian taxa." PE 10 at PE148; Tr. 290. When Kunz exposed these mayflies in a lab to the reconstituted water from Boardtree Branch, none survived. PE 10 at PE140; Tr. 288. The water was toxic at conductivities from 800 to 1300 µS/cm, which bracket the same extirpation concentration observed in the field. Tr. 289-90.

Dr. King explained why temperature does not confound the relationship between conductivity and impairment. Using a filtered subset of the West Virginia database, he charted summer temperatures versus number of mayfly taxa. JE 32; Tr. 278-79. That chart shows that the number of mayfly taxa is relatively unchanged across the entire range of temperatures. Tr. 279-80. The relationship "is virtually non-existent" and "strongly refutes the idea that temperature is a confounding factor." Tr. 334. If temperature were driving the relationship, the chart would not look anything like it does. Tr. 282, 338. In contrast, when Dr. King drew a

chart comparing conductivity versus number of mayfly taxa, there is “a very sharp, non-linear decline in the number of mayfly taxa as conductivity increases.” JE 31; Tr. 280-81. Thus, conductivity rather than temperature is driving the impairment. Tr. 370.

Turning to the site-specific evidence in this case, Dr. King said that Dr. Swan found no mayflies or other sensitive taxa in Stillhouse Branch in Fall 2013. Tr. 304. Instead, he only found taxa that are tolerant to high conductivity and that are “the toughest of the bunch.” Tr. 302-04. The most sensitive of the identified taxa is not extirpated until the conductivity is over 2000 µS/cm. Tr. 303.

Dr. King stated that “the bottom line” is that the high conductivity measured in Stillhouse “will unequivocally impair a stream.” Tr. 306. He also believed that neither habitat nor temperature are the cause of impairment. The measured RBP score was 130, which is a fairly average value for streams. *Id.* The measured temperatures at the site, which go as high as 24° C, could not result in biological impairment. *Id.* Numerous West Virginia streams with temperatures in excess of 24° C have abundant mayfly taxa. JE 32.

King concluded that “unequivocally the principal cause is conductivity associated with the mine, and that if you were to reduce the conductivity to a level of, say, 200, that you would see a dramatic increase in the number of sensitive taxa.” Tr. 307. However, lowering the stream temperature by two or three degrees “would have absolutely no effect on this stream.” Tr. 308. He is “absolutely convinced” that it would still be biologically impaired. *Id.*

IV. Fola’s Expert Testimony

In contrast to Plaintiffs’ experts, Fola’s two experts did not cite a single peer-reviewed study in support of their opinions. Tr. 505, 737-39. Unlike Plaintiffs’ experts, they have never published peer-reviewed studies on the impact of conductivity on streams in Appalachia. They developed their opinions for Fola only in response to litigation. (Dr. Menzie even changed his

opinion from the one he held as a neutral reviewer of the Benchmark. Tr. 654-55). They did not attempt to determine the cause of the observed biological impairment in Stillhouse Branch. Tr. 527, 651-53. They did not testify that any factor caused the impairment. Instead, their testimony was limited to trying to show that the relationship between conductivity and impairment may be confounded by temperature and habitat.

A. Dr. Charles Menzie

Fola's principal expert was Dr. Charles Menzie. He agreed with much of Plaintiffs' evidence. He agreed that large-scale surface mining in Central Appalachia is raising conductivity significantly and that many WVSCI scores in the streams below surface mines are below 68. Tr. 649-50. He agreed that mining contributes to the lowering of WVSCI scores, and that at Stillhouse, Fola's mine is the only reason that the WVSCI score is so low. Tr. 651. He agreed that the conductivity in Stillhouse is over 3000, sulfates are over 2000, and the stream is impaired because of mining. *Id.* Dr. Menzie agreed that high conductivity has adverse effects on aquatic life, but he believed, unlike Plaintiffs' experts, that those effects begin when conductivity is about 2000 µS/cm. Tr. 652. While most of his testimony focused on the possible effects of temperature or habitat on biological impairment, he did not claim that either one of those factors is a cause of impairment in Stillhouse Branch. Tr. 651-52. He merely claimed "that temperature is playing a potentially important role there." Tr. 613. His position was that high conductivity, temperature, and habitat are multiple stressors that all contribute to the observed impairment in Stillhouse. Tr. 644, 652-53. "I think all of those factors . . . may be involved" but "we haven't determined what their relative importance are." *Id.*

Dr. Menzie's primary hypothesis, which has never been published or peer-reviewed, was that the streams like Stillhouse Branch, which are below mines with reduced forest cover and

sediment ponds, have higher temperature water than reference streams, and that as temperature increases, there is a shift from sensitive to tolerant species, which decreases the WVSCI score. Tr. 602-06. This hypothesis directly opposes the consensus in the scientific literature. Dr. Menzie's data analysis in support of that conclusion has many weaknesses that skewed his results. He did not filter the database for urban development, even though urban sites have higher water temperatures. Tr. 668. In comparing the temperatures in Stillhouse with the temperatures in the larger state-wide database, he used temperatures from different years—that did not even overlap—even though temperature varies considerably from year to year. Tr. 702-03, 741-43, 782-83, 811. His conclusions about the thermal preferences of aquatic insects are not supported by the literature he cited, and he did not perform any statistical analysis of the temperature distributions. Tr. 779, 783-84. He only analyzed the thermal preferences of fifty taxa, when West Virginia has over 500. Tr. 786. In addition to being in opposition to all of the currently published literature, Dr. Menzie's hypothesis is refuted by the fact that mayflies are present and abundant at sites with temperatures well above his "thermal transition zone." Tr. 808-10; JE 32.

Dr. Menzie's secondary hypothesis was that impairment may be confounded by poor habitat, because his data analysis indicated that poor habitat is related to a decline in WVSCI scores. Tr. 625, 630-31. However, he excluded sites with suboptimal habitat from his analysis, even though there are many such sites and Stillhouse falls in the suboptimal category. Tr. 632-33, 673-74, 784. As Dr. Palmer explained on rebuttal, Pond's 2014 peer-reviewed study controlled for habitat and found that biological variation among WV streams at mine sites was strongly controlled by water chemistry, not habitat. Tr. 788-89. Much of Dr. Menzie's testimony regarding habitat was based on an RBP analysis performed by WVDEP at the mouth

of Stillhouse Branch showing a high degree of embedddeness. Tr. 617-19. Dr. Menzie, however, did not address the fact that other measurements by WVDEP at the same location showed much better scores for this habitat factor. Tr. 725-32; JE 81. He did not address habitat at the location assessed by Dr. Chris Swan. Tr. 648. He also did not address the fact that the embeddness is most likely due to deposits from precipitated ions related to conductivity. Tr. 93-95, 762-63.

B. Carrie Kuehn

Ms. Kuehn was not a credible expert witness. While she pointed to the importance of a priori knowledge throughout her testimony, Tr. 411, 435, 436, 455, 465, 467, 528, she has no training in ecology and has no experience analyzing ecological data. Tr. 484, 494. All her published papers deal with human subjects. Tr. 490. She trained at an institution that defines epidemiology as, "the study of the frequency, distribution, and deterrence of diseases in human populations." Tr. 481.nnShe has testified as an expert in only one other case, in which the judge rejected her testimony as unreliable. Tr. 479. While claiming to be an expert in statistics, she could not remember what statistical method she used in two of her published papers. Tr. 486-88. She called EPA's response to the SAB's comments about "non-metric multidimensional scaling" in the Benchmark "nonsensical," but she did not even know what that statistical method was. Tr. 513-15. Her statistical experience is limited to applying prepared statistical software programs to the data that comes before her. Tr. 524.

Her analysis was limited to the EPA Benchmark, the Pond 2014 study, and Dr. King's expert report. Tr. 501. She had no opinion about the other studies that Plaintiffs relied on, including the "How Many Mountains" and Cormier and Suter papers. *Id.* Indeed she was not familiar with most of these studies as she had "not done a full critique of the body of literature on this particular topic." Tr. 543. As to the Benchmark, which was the main focus of her

testimony, she thought it was done to "examin[e] the effect of conductivity on stream impairment as measured by the WVSCI." Tr. 518. In fact, as Dr. Menzie stated, the Benchmark identified the genera that are extirpated by conductivity and "has nothing to do with informing us about GLIMPSS or WVSCI." Tr. 656; *see also*, Tr. 61 (testimony of Dr. Palmer explaining the Benchmark was derived looking at the relationship between conductivity and extirpation of specific organisms); Tr. 240 (testimony of Dr. King to the same.). As Dr. King noted, "it's rather remarkable that her entire testimony was based on debunking the benchmark when in fact she didn't even understand what the outcome of interest was." Tr. 800.

Argument

I. Fola's Violations of Narrative Water Quality Standards Are Federally Enforceable under the CWA and SMCRA

The Clean Water Act authorizes citizens to sue any person who violates its NPDES permit. 33 U.S.C. §§ 1365(a)(1), (f)(6). Noncompliance with an NPDES permit constitutes a violation of the CWA. *Sierra Club v. Powellton Coal Co., LLC*, 662 F. Supp. 2d 514, 516 (S.D. W. Va. 2009). Specifically, citizens may enforce a permit condition that requires compliance with narrative state water quality standards. *Elk Run*, 2014 WL 2526569, at *1. Fola's permit incorporates the "water quality standards provision in § 47–30–5.1.f [which] resulted in an explicit, enforceable permit condition." *OVEC v. Fola Coal Co., LLC*, 2013 WL 6709957, at *11 (S.D.W. Va. Dec. 19, 2013). Here, Plaintiffs are seeking to enforce a narrative water quality standard which imposes liability if a person discharges materials "which have <u>caused or materially contributed</u> to a significant adverse impact to the chemical and biological components of the applicable stream's aquatic ecosystem." *Elk Run*, 2014 WL 2526569, at *1 (emphasis added).

Similarly, SMCRA authorizes citizens to sue any person who violates a permit issued

pursuant to SMCRA. 30 U.S.C. § 1270(a)(1). Violations of WVDEP mining permits and regulations issued under SMCRA are enforceable by citizens in federal court. *Molinary v. Powell Mountain Coal Co., Inc.*, 125 F.3d 231, 237 (4th Cir. 1997); *OVEC v. Apogee Coal Co., LLC*, 531 F. Supp. 2d 747, 762-64 (S.D.W.Va. 2008). WVDEP and federal regulations issued under SMCRA require mining operations to comply with water quality standards. 38 C.S.R. § 2-14.5.b.; 30 C.F.R. § 816.42. Thus, violations of water quality standards incorporated into both CWA and SMCRA permits are federally enforceable in citizen suits, and Plaintiffs have viable claims against Fola under those two statutes.

A. Plaintiffs' burden is to show, by a preponderance of the evidence, that pollutants, measured as conductivity, are causing or materially contributing to biological impairment in Stillhouse Branch

In a CWA or SMCRA citizen suit, a plaintiff need only prove a defendant's violation by a preponderance of the evidence. *Elk Run*, 2014 WL 2526569, at *1. "The burden of showing something by a 'preponderance of the evidence,' the most common standard in the civil law, simply requires the trier of fact to believe that the existence of a fact is more probable than its nonexistence before [he] may find in favor of the party who has the burden to persuade the [judge] of the fact's existence." *Concrete Pipe & Prods. of Cal., Inc. v. Construction Laborers Pension Trust*, 508 U.S. 602, 622 (1993).

Plaintiffs' burden in this case is to show <u>either</u> causation <u>or</u> a material contribution. 47 W.Va. C.S.R. § 47-2-3.2. Strict "but for" causation or proximate causation is not required. A "material contribution" standard means that "more than one factor can be a substantial cause, and no single factor need be the sole causative element." *Frito-Lay, Inc. v. Local Union No. 137*, 623 F.2d 1354, 1363 (9th Cir. 1980); *accord*, *Feather v. United Mine Workers of America*, 903 F.2d 961, 967 (3rd Cir. 1990).

To meet their burden, Plaintiffs need only demonstrate a legal probability, not scientific proof, that there is either causation or a material contribution. The preponderance of the evidence standard does not require "scientific certainty." *Bunting v. Secretary of Health & Human Servs.*, 931 F.2d 867, 873 (Fed. Cir. 1991). The test is "not scientific certainty but legal sufficiency." *Ferebee v. Chevron Chem. Co.*, 736 F.2d 1529, 1536 (D.C. Cir. 1984). The fact "that science would require more evidence before conclusively considering the causation question resolved is irrelevant." *Id.* "Scientific convention defines statistical significance as 'P≤ .05,' *i.e.*, no more than one chance in twenty of a finding a false association due to sampling error. Plaintiffs, however, need only prove that causation is more-probable-than-not." *In re Ephedra Products Liab. Litig.*, 393 F. Supp. 2d 181, 193 (S.D.N.Y. 2005).

It follows from that principle that a formal causal, epidemiological analysis is not required, but only reasoned and reliable expert testimony that tends to prove that causation or a material contribution is probable. The law in this Circuit supports that conclusion. *See Benedi v. McNeil-P.P.C., Inc.*, 66 F.3d 1378, 1384 (4th Cir. 1995) ("epidemiological studies are not necessarily required to prove causation, as long as the methodology employed by the expert in reaching his or her conclusion is sound").

Finally, in judging the reliability of expert testimony, the courts have given greater weight to opinions that have been subjected to normal scientific scrutiny through peer review and publication, than to opinions that were developed expressly for purposes of testifying and have not been published or peer-reviewed. *See Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 593–97 (1993) (noting that one factor in assessing the reliability of expert testimony is whether the theory espoused enjoys general acceptance within a relevant scientific community); *Clausen v. M/V NEW CARISSA*, 339 F.3d 1049, 1056 (9th Cir. 2003); *Amorgianos v. Nat'l R.R.*

Passenger Corp., 303 F.3d 256, 266-67 (2d Cir. 2002) (a lack of textual support in the published literature for an expert's opinion goes to the weight of his testimony).

B. Plaintiffs Have Demonstrated that High Levels of Ions in Alkaline Mine Drainage, Measured as Conductivity, Are the Principal Cause of Impairment in Stillhouse Branch

Plaintiffs have demonstrated that conductivity is the principal cause of impairment in Stillhouse Branch. To prove general causation, Dr. Palmer and Dr. King relied on a long-line of uncontroverted peer-reviewed literature, as well as work performed by EPA and scrutinized by dozens of eminent scientists on the EPA's Scientific Advisory Board and a panel commissioned by that board with specific expertise on aquatic ecology and mountaintop mining. As Dr. Palmer explained, that line of literature now extends to over than 20 papers authored by more than 50 scientists. Tr. 26, 28-29. Indeed the literature agrees so well that Dr. King described it as a "consensus" that can now be accepted as a "fact of science." *Id.* at 254-55. This literature includes work done on large datasets from West Virginia and Kentucky, (JE 58 at 388, 589; PE 2; Tr. 238-40) and smaller sample sets of intensively studied watersheds (Tr. 244-45; PE 15; PE 19). It includes experiments designed to eliminate potential confounding factors (PE 19 at PE294; Tr. 52-57) and studies using data filtered to do the same (PE 2; Tr. 238-40). It includes work performed using different outcomes of interest, including WVSCI (PE 2 at PE23; Tr. 239, 247, PE 15; Tr. 40-41, 214-15, 247; JE 58 at 464); GLIMPSS (PE 2; Tr.246 , PE 15, Tr. 214-15, 247) TITAN, which looks for sharp declines in species abundance, (PE 2; Tr. 240) and extirpation of genera using species sensitivity distributions (JE 58). The work even includes formal analyses of causation (JE 58 at JE429-JE471; PE 5; Tr. 257-72) as well as the potential for the observed relationship to be confounded by other factors (JE 58 at JE472-JE509; PE8; Tr. 272-74). Despite the diversity of inquiries and methods, all of these studies are in remarkable agreement that 1) high conductivity from Appalachian mines causes biological degradation; 2)

that this degradation is significant at a level around 300 µS/cm; and 3) that the degradation is marked by the decline of specific taxa—notably mayflies.

In short, the testimony of Dr. King and Dr. Palmer on general causation was well-reasoned, reliable, and supported by an abundance of scientific literature—there is widespread agreement and nothing to the contrary. In contrast, the issues of causation and confounding factors raised by Dr. Menzie have been researched and peer-reviewed by top-notch scientists and rejected. There is not a single study in the published literature to support those theories—only the opinion of one expert consultant, who changed his opinion to fit the present litigation, and another who did not understand the basic analysis of the document she was hired to criticize.

This Court relied on many of the same studies that Plaintiffs used in this case to find general causation concerning the same conductivity/impairment issue in the *Elk Run* case. 2014 WL 25265669, at *18-*23. The Court held that "the science in EPA's Benchmark is independently compelling" and "numerous other scientific studies published in peer-reviewed journals –both before and after publication of the Benchmark—lead to the same conclusion." *Id.* at *20-*21. Plaintiffs' experts relied on those same studies in this case, including the 2008 Pond study (PE 15), the 2010 Palmer study (PE 13), the 2010 Pond study (PE 16), the 2011 Lindberg study (PE 11), the 2012 Pond study (PE 17), and the 2012 "How Many Mountains" study (PE 2). *Id.* The Court found "the expert testimony of Dr. Palmer and Dr. King to be very persuasive." *Id.* at *22. The Court also noted that WVDEP's own guidance shows that conductivity levels above 1533 µS/cm are "definite stressors," which supports a causal connection. *Id.* at *23. Based on this evidence in *Elk Run*, which is essentially the same as that presented in this case, the Court concluded that there was "overwhelming scientific evidence" that Plaintiffs had established general causation and material contribution. *Id.*

As to specific causation, there is no dispute Fola has discharged alkaline mine drainage containing harmful ionic chemicals, including sulfate, calcium, magnesium and bicarbonate, which are measured as conductivity, into Stillhouse Branch. JE 43 at JE127-28; JE 21 at JE86; JE 81. The level of conductivity has increased by thirty times from about 100 µS/cm prior to mining to about 3000 µS/cm today. JE 43 at JE127-28; JE 4. Sulfate has increased nearly one hundred times from 22 µS/cm prior to mining to over 2000 µS/cm today. JE 43 at JE127-28; JE 4 Likewise there is no dispute that the aquatic life in Stillhouse Branch is biologically impaired, as measured by WVSCI scores. JE 43 at JE128; JE 13. Or, that the observed impairment is the result of Fola's mining operation. Tr. 651.

Drs. Palmer and King both testified that, based on their review of the applicable scientific literature and site-specific chemical and biological evidence, the levels of conductivity discharged by Fola are causing the observed biological impairment downstream in Stillhouse Branch. Drs. Palmer and King analyzed the site-specific evidence, including the chemical and biological sampling results, and explained why no other cause of impairment was likely. The WVSCI scores consistently show biological impairment. JE 43 at JE129; JE 13 at JE48. Sensitive taxa such as mayflies are completely absent. Tr. 82. The macroinvertebrate taxa that are present are either the last holdouts of sensitive taxa, or taxa indicative of high conductivity. Tr. 302-04. Research shows that mayflies are ubiquitous when conductivity is low, even if temperatures are high, but absent when conductivity is high. JE 58 at JE492. In addition, the suboptimal habitat score in Stillhouse Branch cannot explain the absence of mayflies or the observed level of impairment. JE 58 at JE482; Tr. 98, 306. The chemical sampling shows that conductivity, sulfate and calcium are very high. Research shows that at these reported levels, the probability of impairment is over 90%. JE 25; JE 31; JE 58 at JE 464. The measured

temperature in Stillhouse is not unusual compared to temperatures in Appalachian reference streams. JE 32; Tr 83. The RBP score for habitat in Stillhouse is suboptimal, but not particularly bad. JE 12; Tr. 97-98. In addition, the suboptimal habitat score in Stillhouse Branch cannot explain the absence of mayflies or the observed level of impairment. JE 58 at JE482; Tr. 98, 306. Viewed in light of their years of experience studying Appalachian streams, Dr. Palmer and Dr. King reasonably concluded that this evidence shows that high conductivity is the specific cause of biological impairment in Stillhouse Branch. This Court reached the same conclusion about specific causation based on similar evidence in *Elk Run*. 2014 WL 2526569, at *24-*36.

The testimony of Dr. Palmer and Dr. King was not credibly rebutted by Fola's expert, Dr. Menzie, who did not perform any analysis of the cause of impairment himself, but simply opined that there was a basic flaw in the analysis of each of the dozens of other scientists and reviewers who had examined the relationship between conductivity and biological degradation. Tr. 651-52.

C. Alternatively, Plaintiffs Have at Least Demonstrated that High Conductivity Materially Contributes to the Impairment in Stillhouse Branch

Fola framed its entire defense in this case as if a finding of liability requires a showing of strict tort-like causation. But the "materially contribute" test in West Virginia's narrative water quality standard does not require proof of causation. Instead, it only requires Plaintiffs to show that Fola has discharged pollutants that "materially contribute to" conditions which have "significant adverse impacts to the chemical . . . or biological components of aquatic ecosystems." 47 C.S.R. § 2-3.2. The law is that the "material contribution" standard means that "more than one factor can be a substantial cause, and no single factor need be the sole causative element." *Frito-Lay*, 623 F.2d at 1363. Thus, the standard is violated if Fola has discharged ions that result in high conductivity, and that high conductivity is one of the factors that materially contributes to the observed chemical or biological impairment in Stillhouse Branch. Drs. Palmer

and King both testified that Fola has discharged pollutants that caused Stillhouse to have high conductivity, and that high conductivity is the primary or principal contributor to biological impairment. Tr. 21, 25, 44 ("primary leading factor"), 90-91, 117 (Palmer); Tr. 306-08, 369 ("principal cause") (King). In addition, WVDEP has officially identified ionic toxicity in its TMDL report as the "primary stressor" in Stillhouse Branch. Tr. 380; DE 8, p. 15.

Neither of Fola's experts disputed these conclusions. Ms. Kuehn's testimony focused exclusively on causation in the epidemiological sense of that term. She did not deny that conductivity is a contributing factor. Dr. Menzie went so far as to admit that Fola's mine is causing the biological impairment in Stillhouse Branch, and stated that he believed that the contributing factors to that impairment are conductivity, habitat and temperature. Tr. 651-53. He admitted that conductivity over 2000 µS/cm can have an adverse effect on aquatic organisms, and that Fola's discharges are over that threshold—a level frequently exceeded in Stillhouse Branch. *Id*. Plaintiffs have unquestionably met the "materially contribute" test for liability. .

II. Plaintiffs have Shown that Fola's Mine Has Violated SMCRA by Causing Violations of Water Quality Standards and Material Damage to the Hydrologic Balance Outside of Its Permit Area in Stillhouse Branch

In addition to violating the CWA, Fola's mining operations have violated SMCRA by violating two performance standards adopted by West Virginia pursuant to the State Surface Coal Mining and Reclamation Act: (1) the standard prohibiting a violation of water quality standards (38 C.S.R. § 2-14-.5.b.) and (2) the standard prohibiting material damage to the hydrologic balance outside the permit area (38 C.S.R. § 2-14.5). Compliance with these standards is a requirement of Fola's SMCRA permit. 22 W.Va. Code § 22-3-13. As explained in the preceding sections, Fola has clearly violated water quality standards.

The definition of "material damage" does not appear in the regulatory section containing performance standards. *See* 38 C.S.R. § 2-14. It does, however, appear in a separate section

describing permit application requirements. 38 C.S.R. § 2-3.22.e. There, material damage is described as "any long term or permanent change in the hydrologic balance caused by surface mining operation(s), which has a significant adverse impact on the capability of the affected water resource(s) to support existing conditions and uses." *Id.*

When WVDEP implemented the program change to insert this definition it was required to seek approval from the federal Office of Surface Mining Reclamation and Enforcement (OSM). 30 U.S.C. § 1253. In its explanatory letter seeking approval, the WVDEP explained that the phrase "capability of the affected water resource(s) to support existing conditions and uses requires it to consider water quality standards it has promulgated pursuant to § 303(a) of the federal Clean Water Act as part of the material damage inquiry under surface mining law." *Ohio Valley Environmental Coalition, Inc. v. Salazar*, 2011 WL 11287 at *4 (S.D. W.Va. Jan. 3, 2011). OSM relied upon this interpretation, for its approval, finding:

> under the proposed definition, in order to assure that mining will not result in a long term or permanent change in the hydrologic balance which has a significant adverse impact on the capability of a receiving stream to support its uses, a proposed mining operation must *consistently* comply with the water quality standards for the designated uses for the receiving stream.

Id. at *5 (emphasis added).

In the case of Surface Mine No. 3, rather than consistently complying with water quality standards, Fola has consistently violated them. These violations are apparent from the discharges of high levels of conductivity and sulfates since the mine has been in operation as well as the consistently failing WVSCI scores. The presence of the stream on West Virginia's 303(d) for biological impairment is proof of a long term adverse impact on the capability of the stream to support its uses. JE 13; JE 43, at JE128-29; JE 59. This damage is further illustrated by the composition of the macroinvertebrate community in the stream, which serves as a long

term indicator of stream conditions. Tr. 236-37. As demonstrated by the sampling of Dr. Swan and the testimony of Drs. Palmer and King, this stream no longer has the diversity of insect species one would expect in a healthy Appalachian Stream, but only the "toughest of the bunch."

III. Fola Has Violated Its CWA and SMCRA Permits on at Least Two Days

Plaintiffs filed their Complaint on April 24, 2013. Doc. 1. The statute of limitations for CWA citizen suits is five years plus sixty days, which means that violations since February 23, 2008 are actionable in this case. *PIRG v. Powell Duffryn Terminals, Inc.*, 913 F.2d 64, 73-76 (3d Cir. 1990). Plaintiffs' evidence shows that, within that time, WVSCI scores in Stillhouse Branch were below 68 on May 9, 2012 and September 30, 2013. JE 43 at JE129; JE 13 at JE48. Fola discharged high levels of ionic chemicals, including sulfate, and measured as conductivity from Outlet 029, on a consistent basis from 2011 to 2013. *Id.* Fola has therefore violated its WV/NPDES and SMCRA permits on at least those two days. Plaintiffs are entitled to a declaratory judgment finding Fola in violation of the CWA and SMCRA on those two days.

Conclusion

For these reasons, the Court should enter a declaratory judgment finding Fola liable for violating its CWA and SMCRA permits.

Respectfully submitted,

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